OPERATING SUMMARY

CONTARIO WATER RESOURCES COMMISSION

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JAN 2 1 1972

ONTARIO WATER
RESOURCES COMMISSION

THUNDER BAY

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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Water management in Ontario

Ontario Water Resources Commission 135 St. Clair Ave.W. Toronto 195 Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D.S. Caverly, General Manager. D.A. McTavish, P. Eng.,

Director,

Division of Plant Operations.

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135 St. Clair Avenue West Toronto 195

THUNDER BAY water pollution control plants

operated for

THE CITY OF THUNDER BAY

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

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INTRODUCTION

1970 marked the final year that the Port Arthur and Fort William Water Pollution Control plants operated as independent units. On January 1, 1971, the operation of both plants were combined under the responsibility of a superintendent.

Both plants will continue to be operated for some time, but a consultant's report is expected to recommend the closing of the Port Arthur plant, (now referred to as Thunder Bay North) and the expansion of the Thunder Bay South (Fort William) plant to treat all sewage flows from the City of Thunder Bay.

The operating data for both plants for 1970 is contained in this report. When comparing the operation of the two plants, the differing conditions, of design capacity and the amount of flow to each plant must be considered.

GENERAL

Both plants were operated 16 hours a day, seven days a week. In addition to the treatment plant, the Brunswick pumping station and the Kam interceptor sewer chambers were maintained by the South plant staff. Few operational problems were encountered at either plant.

EXPENDITURES

The South plant operated at a total cost of \$94,886.20. This represented an average cost of \$46.00 per million gallons of treated sewage and 6.7 cents per pound of BOD removed.

The North plant operated at an average flow almost 50% above design flow. This reduced the average cost per million gallons to \$36.00 and the cost per pound of BOD removed to 6 cents. The total operating cost was \$73,065.45.

PLANT FLOWS and CHLORINATION

A total of 2,063 million gallons of sewage received primary treatment at the Thunder Bay South plant. This represented an average daily flow of 5.66 million gallons or 94% of the nominal design flow. Chlorination was carried out from May 17th to December 18th with 30,800 pounds of chlorine applied to the plant effluent during this period, representing an average dosage of 2.1 mg/l.

At the North plant the nominal design flow of 4.0 mgd was exceeded almost daily. During 1970, 2,023 million gallons of sewage; (an average daily flow of 5.53 million gallons) received treatment. Chlorine was applied to the effluent at an average dosage of 3.4 mg/l from May 15 to October 29. To provide this treatment 31,600 pounds of chlorine were utilized.

THUNDER BAY SOUTH

FLOWS	DAILY FLOW	OCCURRING IN THE	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average High Low	5.66 16.20 3.50	October February	171.9 300.9 92.1	May February

THUNDER BAY NORTH

FLOWS	DAILY FLOW	OCCURRING IN THE	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average High Low	5.53 8.20 4.30	May January	168.6 236.6 112.9	May February

PLANT EFFICIENCY

The average influent BOD concentration of 138 mg/l was reduced an average of 43% to 80 mg/l at the South plant. An average efficiency of 52% in suspended solids removal was obtained; influent concentrations of 128 mg/l suspended solids were reduced to 62 mg/l.

Despite the high flows at the North plant, good removal efficiencies were achieved. The influent BOD and suspended solids averaged 150 and 164 mg/l respectively. Average removal efficiencies of 37 and 55% reduced the BOD and suspended solids concentrations to 94 and 55 mg/l respectively.

SLUDGE DIGESTION and DISPOSAL

A total of 6.24 million gallons of raw sludge averaging 2.4% total solids was pumped from the South plant clarifiers to the digesters. The total solids content was increased to 12.4% while the volatile solids content was reduced from 60 to 41% in the digesters. Digested liquid sludge totalling 4325 cubic yards was hauled from the plant by tank truck.

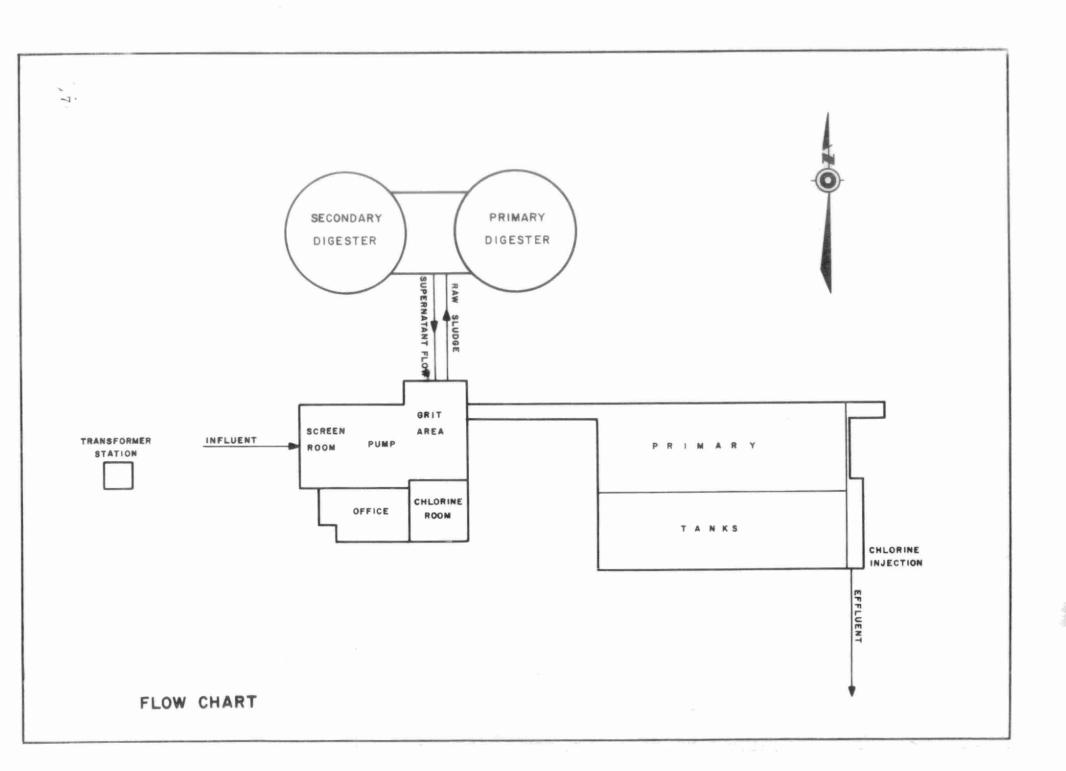
The single stage digester at the North plant increased the average total solids content of the sludge from 3.5 to 7.6% while reducing the volatile solids from 71 to 61%. An improvement in performance was noted with the installation of a digester mixer. 4.78 million gallons of raw sludge were pumped to the digester from the primary clarifiers while 34.8 million gallons of supernatant at 0.4% total solids were returned. A total of 9647 cubic yards of liquid digested sludge was trucked from the plant.

CONCLUSIONS

Both plants provided good primary treatment of the sewage flows received during 1970 with no major difficulties.

Enlargement of the South plant is anticipated which will enable all sewage flows from Thunder Bay to be treated at this single location. The North plant will continue to operate until expansion is completed, at which time its flows will be pumped to the enlarged facilities. This program is expected to take several years to bring to completion.

THUNDER BAY SOUTH



DESIGN DATA

PROJECT No.

2-0091-61

TREATMENT

Primary

DESIGN FLOW

6.0 mgd

DESIGN POPULATION

48,000

PRIMARY TREATMENT

Screening

Trash Racks
 Type: Jeffrey

Size: Two with 3" spacing

- Grinder

Type: Jeffrey (One)

- Coarse bar screens

Type: David Brown

Size: Two with 1" spacing

Sewage Lift Pumps

Type: Fairbanks-Morse

Size: Two 5140 gpm @ 36½' tdh

Two 3490 gpm @ $36\frac{1}{2}$ tdh

(variable speed, electric)

Grit Removal

Type: Aerated; grit removed by

clamshell bucket

Size: One 29' x 25' x 15' deep

Retention: 1.5 min

Primary Sedimentation

Type: Jeffrey

Size: Two 132' x 37' x 10' avg

(622,000 gal)

Retention: 2.5 hours

Loading: Surface, 600 gal/ft2/day

Weir, 10,000 gal/ft/day

CHLORINATION

W & T

Chlorine Contact Chamber

- in effluent chamber

OUTFALL

- to Kam River

SLUDGE HANDLING

Digestion System

Type: Two-stage

Primary --

Type - Gas mixed PFT

Size - One 60' dia (71,000 cu ft or

442,000 gal)

Loading - 3.0 lb/ft³/mo

Secondary --

Size - One 60' dia (71,000 cu ft or

442,000 gal)

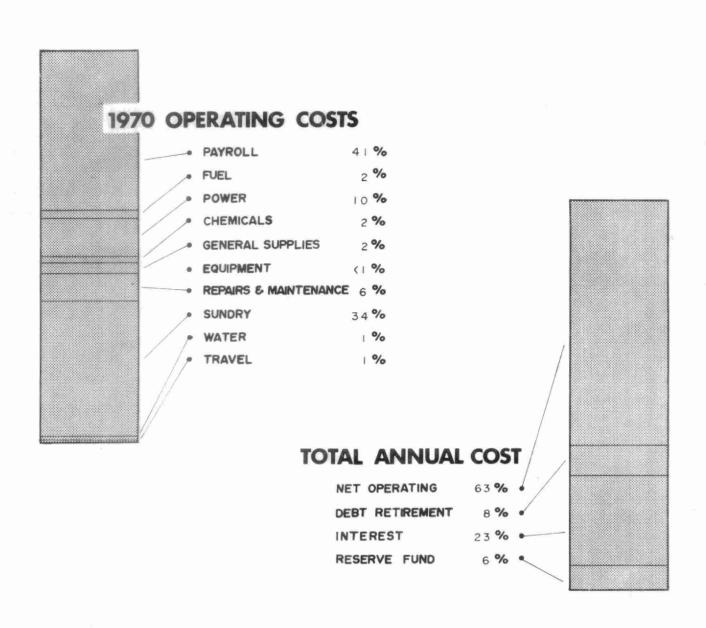
Total Loading - 1.5 lb/ft3/mo

2-0091-61 NET CAPITAL COST (Final)	\$2	, 589, 550. 83
DEDUCT - Portion financed by CMHC/MDLB (Final)	1	, 722, 029.58
Long Term Debt to OWRC	\$	867, 521. 25
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$	<u>124, 901.10</u>
Net Operating Debt Retirement Reserve Interest Charged	\$	130, 882.20 17, 507.00 12, 979.21 48, 603.93
TOTAL	\$	209, 972.34
RESERVE ACCOUNT		
Balance @ January 1, 1970	\$	64, 343.89
Deposited by Municipality		12,979.21
Interest Earned		4, 446.16
	\$	81, 769.26
Less Expenditures		3,808.46
Balance @ December 31, 1970	\$	77, 960.80

2-0050-60 NET CAPITAL COST (Final)	\$1	, 336, 345. 25
DEDUCT - Portion financed by CMHC/MDLB (Final)	_	855, 626. 69
Long Term Debt to OWRC	\$	480, 718.56
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$	96, 583.09
Net Operating Debt Retirement Reserve Interest Charged	\$	9, 701.00 6, 261.25 26, 932.85
TOTAL	\$	42,895.10
RESERVE ACCOUNT		
Balance @ January 1, 1970	\$	74, 213.07
Deposited by Municipality		6,261.25
Interest Earned		4, 939.53
	\$	85, 413, 85
Less Expenditures		
Balance @ December 31, 1970	\$	85, 413. 85

2-0173-64 NET CAPITAL COST (Final)	\$28,502.68
DEDUCT - Portion financed by CMHC/MDLB (Final)	
Long Term Debt to OWRC	\$ <u>28,502.68</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ 3,645.88
Net Operating Debt Retirement Reserve Interest Charged	\$ 250.00 575.00 148.43 1,596.89
TOTAL	\$ 2,570.32
RESERVE ACCOUNT	
Balance @ January 1, 1970	\$ 886.24
Deposited by Municipality	148.43
Interest Earned	60.94
	\$ 1,095.61
Less Expenditures	

2-0175-64 NET CAPITAL COST (Final)	\$835, 832.42
DEDUCT - Portion financed by CMHC/MDLB (Final)	581, 864, 23
Long Term Debt to OWRC	\$ <u>253, 968.19</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ <u>22,692.73</u>
Net Operating Debt Retirement Reserve Interest Charged	\$ 1,036.90 5,125.00 3,647.31 14,228.88
TOTAL	\$ <u>24,038.09</u>
RESERVE ACCOUNT	
Balance @ January 1, 1970	\$ 11,970.69
Deposited by Municipality	3,647.31
Interest Earned	864.04
	\$ 16,482.04
Less Expenditures	
Balance @ December 31, 1970	\$ 16,482.04



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	995.52	\$53, 980.73	\$54.22	16 cents
1967	1441.77	65, 894, 52	45.70	14 cents
1968	2093.0	79, 442.39	37.96	11 cents
1969	1799.7	83, 863.21	46.60	8 cents
1970	2063.0	130,882.20	63.40	10 cents

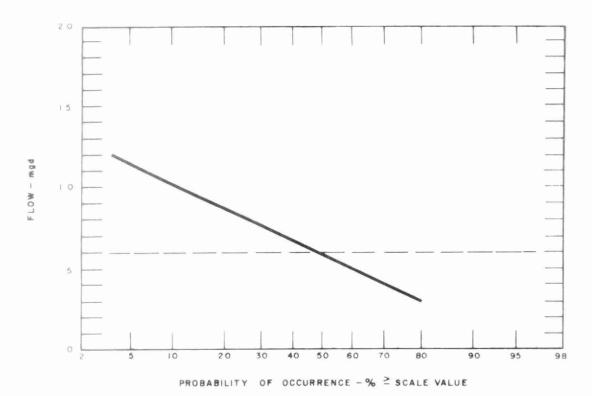
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and	SUNDRY	TRAVEL	WATER
JAN	7360.20	5943.27	-	263.86	890.19	-	145.19	-	57.10	60.59	-	-
FEB	41751.41	4262.37	-	260.74	848.95	-	202.15	-	139.54	36037.66	- :	- "
MAR	6436.24	4254.06	-	288.38	874.93	-	171.89	-	235.15	611.83	-	-
APR	6951.50	4164.70	-	350.73	930.37	-	186.48	-	810.06	446.71	63.45	-
MAY	9708.83	4594.84	-	248.23	1147.99	1178.73	138.38	74.89	2089.06	72.71	-	164.00
JUNE	6583.66	4460.57	72.00	233.44	1392.48	-	210.97	-	83.47	130.73	-	-
JULY	66741.28	4094.23	304.00	187.01	1119.40	19.34	390.31	-	1012.27	59362.63	63.99	188.10
AUG	10552.52	6329,21	331,20	163.74	1187.86	966.00	53.45	20.65	111.20	1389,21	-	-
SEPT	(49266.08)	4030,41	-	101.21	975.97	781.60	351.39	-	249.50	(55840.16)	-	84.00
ост	7894.46	4163.92	-	170.71	1083.90	-	156.53	-	1428.19	766.91	124.30	-
NOV	5655.58	4309.99	-	135.36	169.13	-	505.58	-	222.91	144.61	-	168.00
DEC	10511.60	3559.49	-	351.80	2485.45	-	513.44	4.20	1497.68	837.23	1003.53	258.78
TOTAL	130882.20	54167.06	707.20	2755.21	13106.62	2945.67	3025.76	99.74	7936.13	44020.66	1255,27	565.88

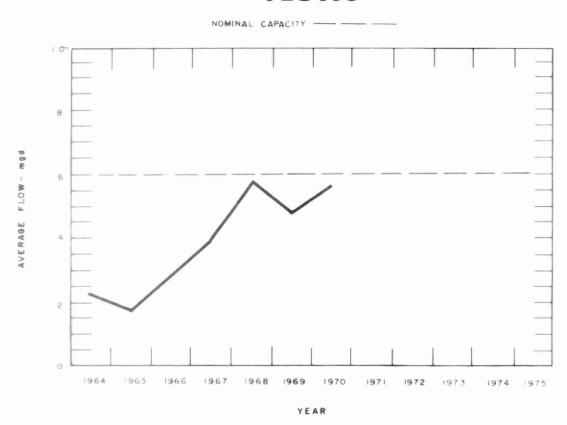
BRACKETS INDICATE CREDIT

 $[\]star$ SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$2,267.10

PROCESS DATA



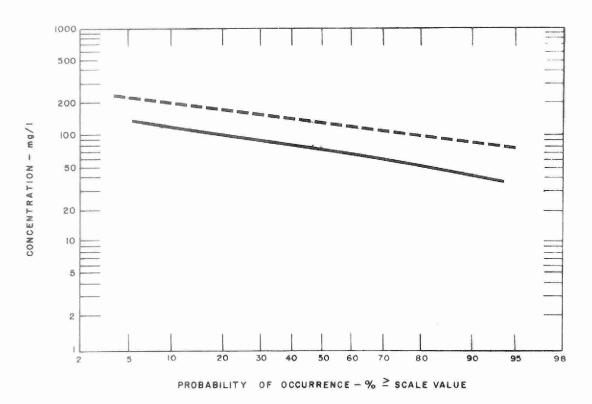
FLOWS



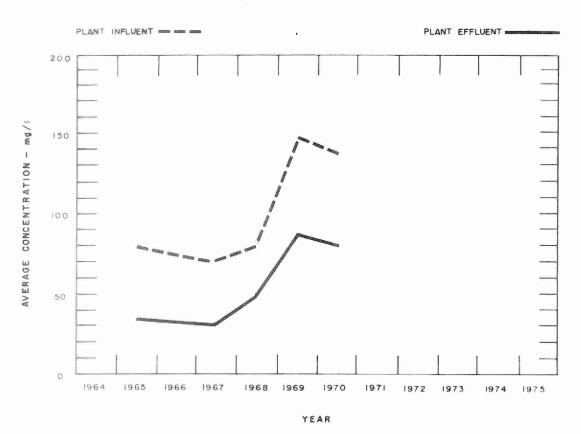
PLANT FLOWS and CHLORINATION

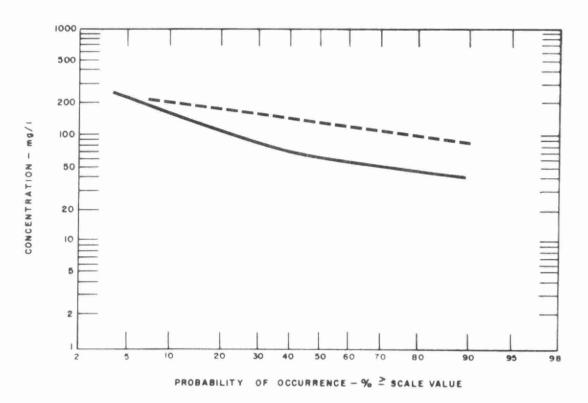
MONTH	TOTAL FLOW	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED	DOSAGE mg/l
JAN	108.5	3.50	3.6	3.2	0	-
FEB	92.1	3.24	3.5	3.0	0	-
MAR	135.0	4.36	6.6	3,2	0	
APR	202.0	6.74	12.9	3,9	0	-
MAY	300.9	9.69	12.8	6.9	3.5*	2.4
JUNE	194.4	194.4 6.47 9.4		5.2	5.9	3.0
JULY	204.5	6.60	10.0	5.1	5.2	2.5
AUG	169.1	5.45	7.2	4.7	4.6	2.8
SEPT	181.8	6.05	10.0	4.8	4.5	2.4
ост	243.6	7.85	16.2	4.5	4.7	1.9
NOV	240.1	8.01	13.0	5.6	1.1	. 4
DEC	172.8	5,58	10.8	4.2	1,3*	1.2
TOTAL	2063.0	-	_	-	30.8	-
AVERAGE	-	5.66	-	-	4.4	2.1

^{*} May 17 and December 18

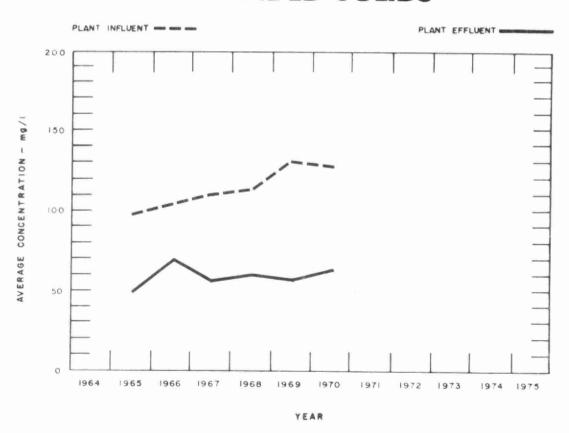


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



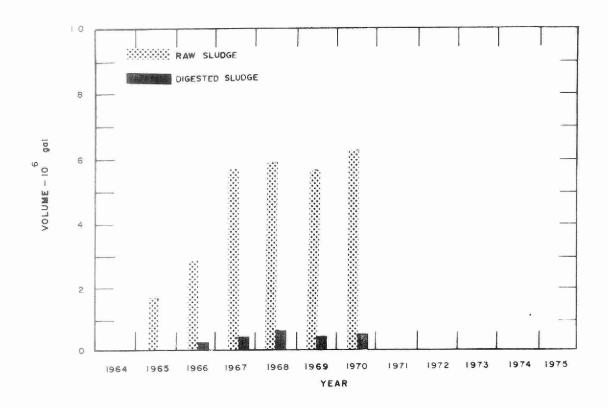
PLANT EFFICIENCY

	BIC	CHEM	ICAL	OXYGE	EN DE	MAND		SUSPE	ENDE	D SOL	IDS		GRIT
MONTH	INFL	UENT	EFF	LUENT	RE	DUCTION	INFL	UENT	EFF	LUENT	REI	DUCTION	REMOVED
MONTH	n	mg/l	n	mg/l	%	10 pounds	n	mg/l	n	mg/I	%	10 pounds	cu ft
JAN	5	180	5	115	36	.7	5	128	5	51	60	.8	98
FEB	5	157	5	101	36	.5	5	125	5	58	54	.6	133
MAR	5	147	5	87	41	. 8	5	215	5	98	54	1.6	175
APR	6	169	6	78	54	1.8	6	178	6	101	43	1.6	231
МАҮ	4	132	4	63	52	2.1	4	93	4	55	41	1.1	266
JUNE	4	170	4	84	50	1.7	4	127	4	59	53	1.3	98
JULY	5	143	5	64	55	1.6	5	134	5	60	55	1.5	84
AUG	4	129	47	85	34	. 6	4	137	47	53	61	1.4	238
SEPT	6	102	6	53	48	. 9	6	101	6	59	42	.8	455
ОСТ	4	92	4	45	51	1.1	4	171	4	80	53	2.2	280
NOV	4	98	4	55	44	1.0	4	129	4	68	47	1.5	224
DEC	6	129	6	84	35	.8	6	105	6	69	34	.6	203
TOTAL	58	-	101	_	-	13,6	58	-	101	-	-	15.0	2485
AVERAGE	_	138	-	80	43	1.1	-	128	-	62	52	1.2	207

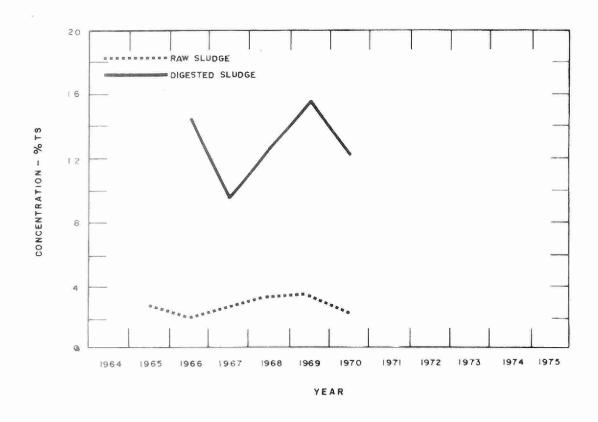
NOTE - n is the number of samples taken

SLUDGE DIGESTION and DISPOSAL

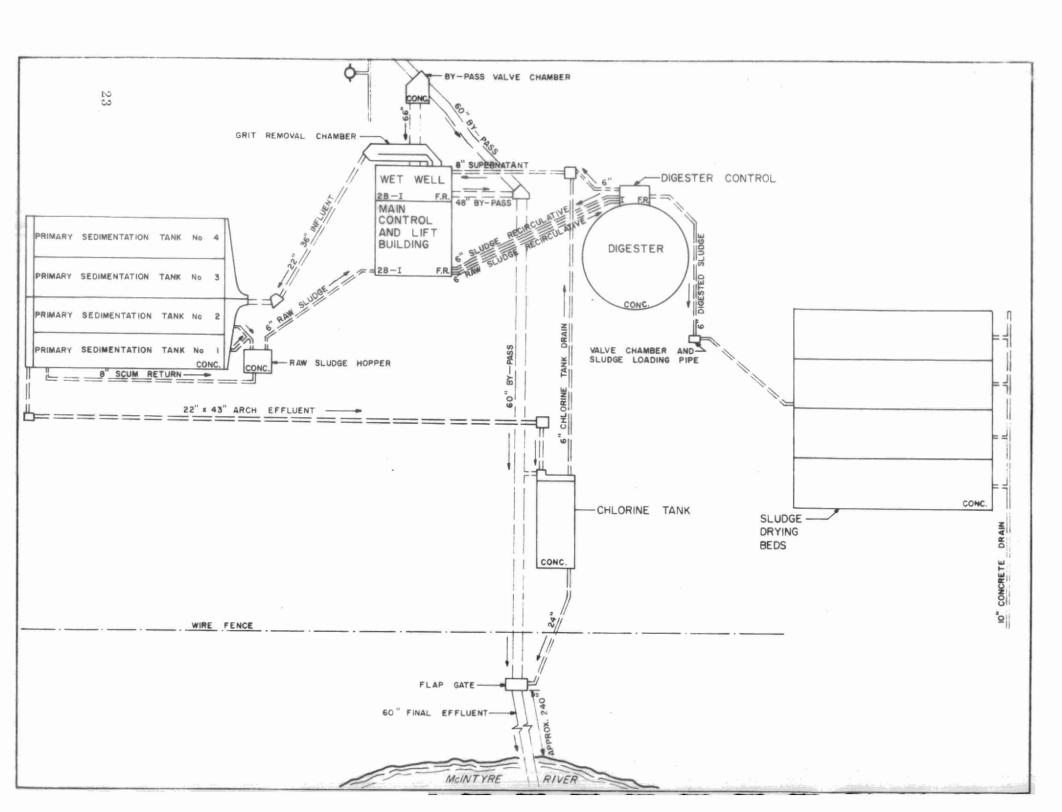
	RAW	SLUDGE	Ε	DIGEST	ED SL	JDGE	SUPERN	ATANT	SLUDGE	DISPOSAL
MONTH	VOLUME	TOTAL		VOLUME	TOTAL		VOLUME	TOTAL	DEWATERED	LIQUID
in the second	10 ⁵ gal	%	%	10 ⁵ gal	%	%	10 ⁵ gal	%	cu yd	cu y d
JAN	4.3	1.8	73	0	10.1	26	-	-	-	0
FEB	4.4	2.1	78	1.3	7.6	49	-	-	-	794
MAR	6.0	.6	56	. 6	16.6	62	-	-	-	363
APR	5.6	.3	64	.3	13.7	46	-	-	-	159
MAY	5.4	-	-	.1	-	-	_	-	-	77
JUNE	4.6	_ ~	-	.5	-	-	_	-	_	308
JULY	4.8	-	-	.2	-	-	-	-	-	1287
AUG	4.7	. 9	49	.7	8.3	36	_	-	_	446
SEPT	5.0	8.7	42	0	18.0	31	-	-	-	0
ост	5.2	-	-	0	-	-	-	-	-	0
NOV	7.0	-	-	1.4	-	-	-	-	-	803
DEC	5.4	-	-	.1	-	-	-	-	-	88
TOTAL	62.4	-	-	5.2	-	-	-	-	-	4325
AVERAGE	5.2	2.4	60	-	12.4	41	-	-	-	481



DIGESTION



THUNDER BAY NORTH



DESIGN DATA

PROJECT NO.

2-0013-58

TREATMENT Primary

DESIGN FLOW

4.0 mgd

DESIGN POPULATION

40,000

PRIMARY TREATMENT

Grit Removal

Type: Channels; mechanically cleaned

(Rex San.)

Size: Two 35' x 3' x 5' deep (6, 540 gal)

Retention: 4.7 min (two channels)

Flow Velocity: 0.248 fps

Comminution

Type: Barminutor

Size: One Model B (35")

One Model A1 (48")

Sewage Lift Pumps

a) Type: Chicago Pumps (ele)

Size: Two 4150 gpm @ 50' tdh

b) Type: Fairbanks-Morse (diesel)

Size: One 29,000 gpm @ 33' tdh

Primary Sedimentation

Type: Jeffrey

Size: Four 100' x 18' x 8' deep

(356,000 gal)

Retention: 2.14 hr

Loading: Surface, 560 gal/ft²/day Weir, 6,000 gal/ft/day

CHLORINATION

Type: W & T

Size: One 500 lb/day

Chlorine Contact Chamber

Size'' 45' x 20' x 10'

Retention: 20 min

OUTFALL

- 240' of 60'' dia corrugated pipe to

McIntyre River

SLUDGE HANDLING

Digestion System - Single-stage

Type: Mixed by recirculation; floating

cover

Size: One 50' dia x 20' swd (50,000 cu ft

or 0.312 mil gal)

Loading: 2.0 lb/cu ft/mo

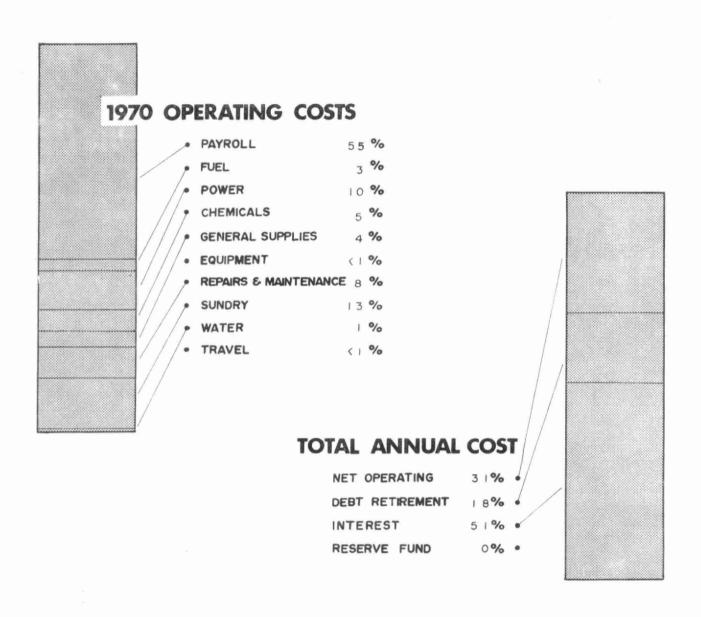
Drying Beds

Size: Four 100' x 25' (10,000 sq ft)

2-0013-58 NET CAPITAL COST (Final)	\$2	, 157, 635. 72
DEDUCT - Portion financed by CMHC/MDLB (Final)	_	1,478.20
Long Term Debt to OWRC	\$ <u>2</u>	, 156, 157. 52
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$	660, 879. 19
Net Operating Debt Retirement Reserve	\$	73,065.45 43,512.00
Interest Charged		120,801.53
TOTAL	\$	<u>237, 378. 98</u>
RESERVE ACCOUNT		
Balance @ January 1, 1970	\$	152,746.02
Deposited by Municipality		-
Interest Earned		10,040.19
	\$	162, 786.21
Less Expenditures		2,167.81
Balance @ December 31, 1970	\$	160,618.40

2-0101-62 NET CAPITAL COST (Final)	\$699, 693. 96
DEDUCT - Portion financed by CMHC/MDLB (Final)	457.785.36
Long Term Debt to OWRC	\$ <u>241,908.60</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ 43,600.97
Net Operating Debt Retirement Reserve Interest Charged	\$ - 4,882.00 3,320.86 13,553.22
TOTAL	\$ 21,756.08
RESERVE ACCOUNT	
Balance @ January 1, 1970	\$ 33,324.14
Deposited by Municipality	3, 320.86
Interest Earned	2,231.01
	\$ 38,876.01
Less Expenditures	
Balance @ December 31, 1970	\$ 38,876.01

2-0156-63 NET CAPITAL COST (Final)	\$610,181.87
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>393, 042.83</u>
Long Term Debt to OWRC	\$ <u>217, 139.04</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ 31,124.57
Net Operating Debt Retirement Reserve Interest Charged	\$ - 4,382.00 2,074.04 12,165.47
TOTAL	\$ <u>18,621.51</u>
RESERVE ACCOUNT	
Balance @ January 1, 1970	\$ 14,671.96
Deposited by Municipality	2,074.04
Interest Earned	997.92
	\$ 17,743.92
Less Expenditures	
Balance @ December 31, 1970	\$ 17,743.92



Yearly Operating Costs

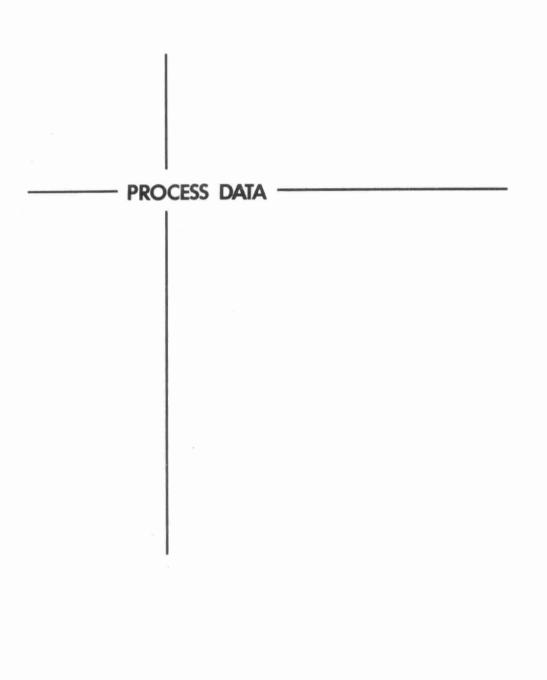
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	1825.52	\$49,656.84	\$27.20	3 cents
1967	1813.46	56, 202.44	30.99	5 cents
1968	1953.80	63,745.04	32.63	5 cents
1969	1716.30	63, 095. 36	36.76	5 cents
1970	2023.20	73, 065. 45	36.10	6 cents

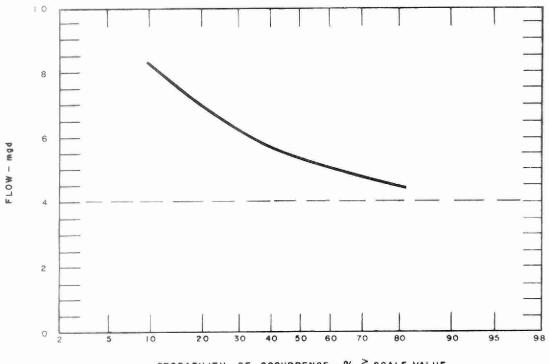
MONTHLY OPERATING COSTS

MONTH	TOTAL. EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and	SUNDRY	TRAVEL	WATER
JAN	5635.91	3514.76	555.67	191.51	534.05	-	175.08	178.80	52.10	16.68	417.26	
FEB	4217.97	2633.50	314.78	370.11	555.03	-	229.99	104.51	(25.44)	19,41	-	16.08
MAR	4755.38	2473.14	370.35	178.81	566.23	-	159.84	_	179.28	599.68	197.15	30.90
APR	5171.40	2450.82	516.28	190.47	612.60	-	147.16	-	456.34	783.00	-	14.73
MAY	7547.38	2849.41	296.12	160.46	699.06	1352.40	181,13	-	1953,88	36.36	-	18.56
JUNE	5445.08	2477.39	718.80	61.88	720.36	-	348.71	-	617.21	72.12	397.60	31.01
JULY	10394.39	2409.33	1067.05	40.58	598.82	-	449.85	53.28	935.78	4825.40	-	14.30
AUG	8546.72	3742.90	1297.86	466.77	609.48	611.12	398.07	-	1290.04	113.65	-	16.83
SEPT	5846.12	2919.17	244.31	143.03	514.26	772.80	213.42	-	83,59	855.64	-	99.90
OCT	4846.31	2886.41	53.85	154.13	546.50	609.84	147.25	-	261.27	102.88	_	84.18
NOV	4503.89	3211.10	-	36.00	-	-	195.17	-	147.38	898.91	-	15.33
DEC	6154.90	2890.46	-	273,95	1356.84	_	318.10	-	299.68	984.64	-	31.23
TOTAL	73065.45	34458.39	5435.07	2267.70	7313.23	3346.16	2963.77	336.59	6251.11	9308.37	1012.01	373.05

BRACKETS INDICATE CREDIT

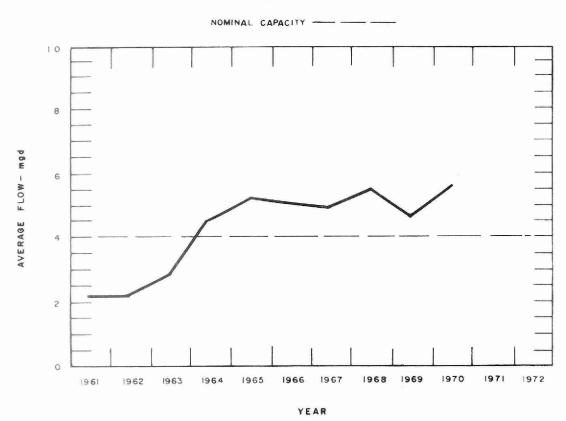
* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$6,682.50





PROBABILITY OF OCCURRENCE - % ≥ SCALE VALUE

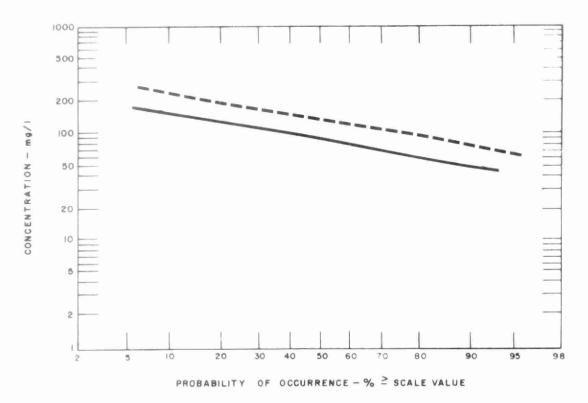
FLOWS



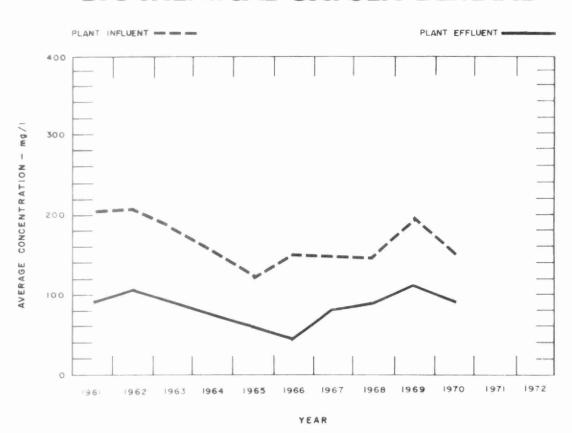
PLANT FLOWS and CHLORINATION

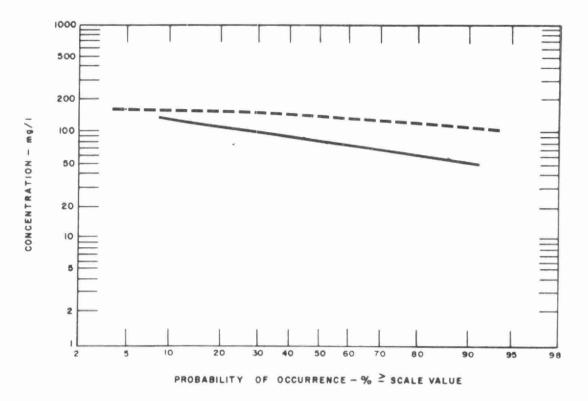
MONTH	TOTAL FLOW	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED	DOSAGE mg/l
JAN	124.4	4.00	4.3	3.8	0	-
FEB	112.9	4.03	4.6	3.7	0	-
MAR	148.8	4.80	6.1	3.9	0	-
APR	200.6	6.67	7.9	5.0	0	-
MAY	236.6	7.62	8.2	6.1	3.3 *	2.5
JUNE	178.0	5.93	8.0	2.0	5.9	3.3
JULY	165.0	5.33	6.2	4.6	5.4	3.3
AUG	144.0	4.65	5.3	4.2	5.6	3.9
SEPT	146.2	4.88	6.1	4.2	5.8	4.0
ост	183.9	5.93	8.0	4.5	5.6 *	3.3
NOV	207.7	6.91	8.0	5.7	0	-
DEC	175.1	5.66	7.7	4.8	0	-
TOTAL	2023.2	-	-	-	31.6	-
AVERAGE	-	5.53	-	-	-	3.4

^{*} May 15 and October 29

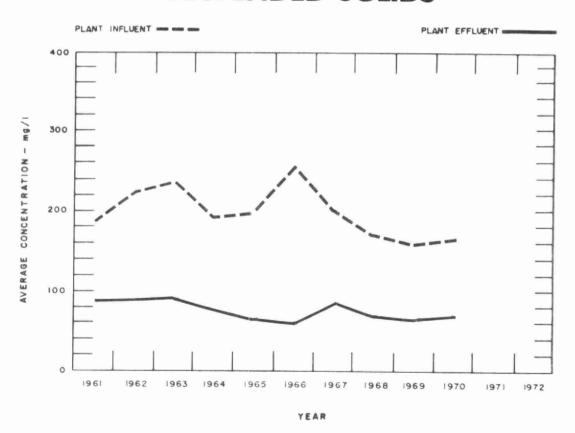


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



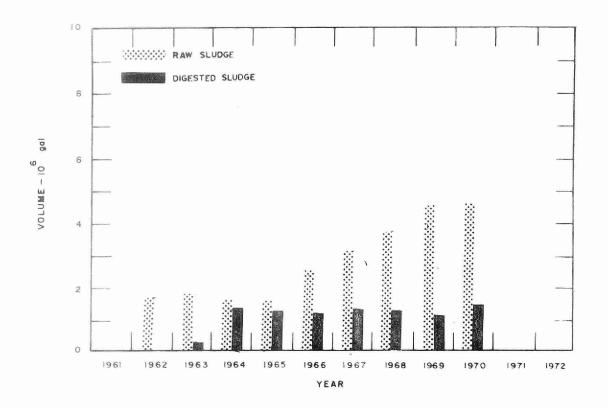
PLANT EFFICIENCY

BIOCHEMICAL OXYGEN DEM						MAND	SUSPENDED SOLIDS						GRIT
MONTH	INFL	INFLUENT EFFLUENT		RE	REDUCTION		INFLUENT		LUENT	REDUCTION		REMOVED	
WORTH	n	mg/l	n	mg/I	%	10 ⁵ pounds	n	mg/l	n	mg/l	%	10 ⁵ pounds	cu ft
JAN	5	213	5	121	43	1.1	5	160	5	88	45	.9	46
FEB	5	158	5	105	33	.6	5	173	5	81	53	1.0	43
MAR	4	193	4	107	44	1.3	4	251	4	130	48	1.8	88
APR	6	169	5	103	39	1.3	6	123	6	78	36	.9	158
MAY	4	106	4	55	48	1.2	4	107	4	69	36	. 9	266
JUNE	5	127	5	61	52	1.2	5	126	5	50	60	1.3	141
JULY	5	148	5	66	55	1.4	5	147	5	70	52	1.3	251
AUG	4	159	55	103	35	. 8	4	251	55	71	72	2.6	116
SEPT	6	139	6	77	45	. 9	6	174	6	66	62	1.6	225
ост	5	129	5	61	53	1.3	5	192	5	73	62	2.2	404
NOV	4	117	4	75	36	. 9	4	148	4	75	49	1.5	246
DEC	6	133	6	92	31	. 7	6	147	6	77	48	1.2	108
TOTAL	59	_	110	;	-	12.7	59	_	110	_	_	17.2	2092
AVERAGE	-	150	-	94	37	1.1	-	164	-	74	55	1.4	174

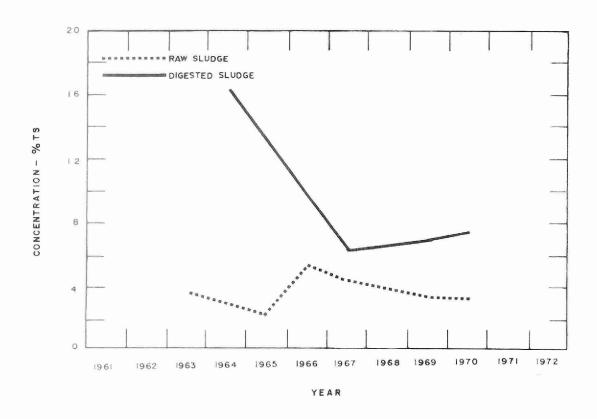
NOTE - n is the number of samples taken

SLUDGE DIGESTION and DISPOSAL

	RAW	SLUDGE	Ε	DIGEST	ED SL	JDGE	SUPERN	ATANT	SLUDGE	DISPOSAL
MONTH	VOLUME	TOTAL		VOLUME	TOTAL		VOLUME	TOTAL	DEWATERED	LIQUID
	10 ⁵ gal	%	%	10 ⁵ gal	%	%	10 ⁵ gal	%	cu yd	cu yd
JAN	3.8	2.0	83	1.1	3.7	80	3.1	-	_	638
FEB	3.4	-	-	1.4	-	-	2.2	. 3	-	836
MAR	4.8	-	-	.8	-	-	4.0	-	-	451
APR	4.4	3.9	75	.5	-	-	3.8	.5	-	308
MAY	3.9	1-1	-	5.5	-	-	.6	-	_	3245
JUNE	3.2		-	3.0	-	-	.6	-	-	1771
JULY	4.6	-	-	0	-	-	4.2	-	-	0
AUG	3,5	4.1	75	0	3.1	-	3.4	. 4	-	0
SEPT	4.3	7.3	42	.5	9.9	50	3.8	. 4	-	308
ост	4.2	1.6	72	1.7	11.1	55	1.9	. 4	-	1034
NOV	3.7	-	-	1.0	-	-	2.4	-	-	594
DEC	4.0	2.6	80	.8	10,4	58	2.2	.3	_	462
TOTAL	47.8	-	-	16.3	-	-	34,8	-	-	9647
AVERAGE	3.9	3.5	71	1.6	7.6	61	2.9	. 4	-	965



DIGESTION



LABORATORY LIBRARY

96936000119612

Date Due

51,62		A TEST	R. C.
1.45			
II S			
11 4	F-10 10 10	100	3200
提 By 17	1		
	155.5		105, THE
2.7			



Water management in Ontario